

## CLAIMS

What is claimed is:

- 1 *Sub*  
2 *a5* } 1. A fiber optic module for transmitting and/or  
3 receiving data, the fiber optic module comprising:  
4 a printed circuit board, the printed circuit board having  
5 high frequency electrical components mounted to a first  
6 surface and a first ground plane formed on the first surface  
7 near a first edge;  
8 a plurality of fiber optic receptacles, the plurality of  
9 fiber optic receptacles coupled to the printed circuit board  
10 in parallel; and  
11 an electromagnetic interference shield, the electro -  
12 magnetic interference shield coupled to the ground plane of  
13 the printed circuit board such that it covers the high  
14 frequency electrical components mounted to the surface and  
15 forms a first guide rail near the first edge.
- 2 2. The fiber optic module of claim 1, wherein,  
3 the first guide rail is formed to slideably couple to a  
4 first guide rail slot of a module cage.
- 1 3. The fiber optic module of claim 1, further  
2 comprising:

3        an optical block, the optical block having a plurality of  
4        lenses, each of the plurality of lenses for coupling photons  
5        between a plurality of fiber optic cables coupled to the  
6        plurality of fiber optic receptacle receptacles and the fiber  
7        optic module.

1        4. The fiber optic module of claim 3 wherein,  
2        the optical block has a plurality of optical ports each  
3        having a fiber ferule inserted therein for aligning the fiber  
4        optic cables to the plurality of lenses of the optical block.

1        5. The fiber optic module of claim 3 wherein,  
2        the optical block has a plurality of openings, each of  
3        the plurality of openings facing each of the respective  
4        plurality of lenses on a second side, each of the plurality  
5        of openings having sufficient size to accept a transmitter or  
6        a receiver.

1           6. The fiber optic module of claim 5, further  
2 comprising:  
3           a plurality of transmitters coupled into the plurality of  
4 openings in the optical block, each of the plurality of  
5 transmitters including a vertical cavity surface emitting  
6 laser.

1        7. The fiber optic module of claim 5 further comprising:  
 2        a plurality of receivers coupled into the plurality of  
 3        openings in the optical block, each of the plurality of  
 4        receivers including a photodiode, and a trans-impedance  
 5        amplifier.

1        8. The fiber optic module of claim 5 further comprising:  
 2        a plurality of transmitters and receivers coupled into  
 3        the plurality of openings in the optical block, each of the  
 4        plurality of transmitters including a vertical cavity surface  
 5        emitting laser and receivers including a photodiode.

6        9. The fiber optic module of claim 1 wherein,  
 2        the electromagnetic interference shield couples to the  
 3        ground plane of the printed circuit board such that it covers  
 4        the high frequency electrical components mounted to the first  
 5        surface and forms a second guide rail near a second edge of  
 6        the printed circuit board.

1        10. The fiber optic module of claim 9 wherein,  
 2        the electromagnetic interference shield sandwiches the  
 3        printed circuit board and the first and second guide rail  
 4        extend outside the electromagnetic interference shield on  
 5        opposites sides of the fiber optic module.



1           16. The fiber optic module of claim 1, wherein the  
2 printed circuit board has surface mount electrical  
3 components.

1        17. The fiber optic module of claim 1, wherein the  
2        printed circuit board has through-hole electrical components.

1        18. The fiber optic module of claim 1, wherein

2        said printed circuit board includes pins outside of said  
3        electromagnetic interference shield, said pins being adapted  
4        to being soldered to a printed circuit board external to said  
5        fiber optic module.

1        19. A fiber optic system for transmitting and/or  
2        receiving data, comprising:

3 a fiber optic module, the fiber optic module having one  
4 or more guide rails electrically coupled to a ground plane of  
5 a printed circuit board and electrically coupled to an  
6 electromagnetic shield surrounding high frequency electrical  
7 components mounted to the printed circuit board, the fiber  
8 optic module further having a plurality of fiber optic  
9 receptacles at one end and one or more electrical connectors  
10 having connectors coupled to signal traces at an opposite end;  
11 and,









8 common area where the high frequency electrical components are  
9 mounted to the printed circuit board; and

10 forming one or more guide rail slots in the printed  
11 circuit board by coupling the electromagnetic shield to the  
12 printed circuit board, the one or more guide rail slots  
13 electrically coupled to a ground plane of the printed circuit  
14 board and electrically coupled to the electromagnetic shield.

1            30. The method of claim 29 further comprising:

2       sliding the fiber optic module into a module cage coupled  
3       to a ground plane of a host printed circuit board, the one or  
4       more guide rails of the fiber optic module to slideably and  
5       electrically couple to one or more guide rail slots of the  
6       module cage.

1        31. A fiber optic system/for transmitting and/or  
2    receiving data, comprising:/

3        a fiber optic module having four channels for parallel  
4        optical transmitting and/or receiving of data;

5 a module cage complying with a standard SC duplex Gigabit  
6 Interface Card package for receiving said fiber optic module;  
7 and,

four optical receptacles that fit into a standard SC duplex Gigabit Interface Card (GBIC) package

10 an electrical component confined within said package on a  
11 printed circuit board to allow hot-plugging into said cage.

1        32. The fiber optic system of claim 31, wherein the four  
2        fiber optical receptacles are LC receptacles.

1        33. The fiber optic system of claim 31, wherein the four  
2        fiber optical receptacles are MT - RJ receptacles.

34. A fiber optic system for transmitting and/or receiving data, comprising:

3       a fiber optic module, the fiber optic module having four  
4       channels for parallel optical transmitting and/or receiving of  
5       data;

6 four optical receptacles that fit into a standard SC  
7 duplex package

8        an electrical component associated with said fiber optic  
9        module confined within a standard SC duplex package and on a  
10       printed circuit board; and

11 a fixed pin-type electric connector to allow said fiber  
12 optic module to be soldered onto a host printed circuit board.

1        35. The fiber/optic system of claim 34, wherein the four  
2        fiber optical receptacles are LC receptacles.

1            36. The ~~fiber~~ fiber optic system of claim 34, wherein the four

